Key Words: High Risk; Naturalized; Biofuel; Water-dispersed; Root Suckers

Family: ***Fabaceae***

Taxon: ***Pongamia pinnata***

Synonym: *Cytisus pinnatus L. (basionym)*
Pongamia pinnata (L.) Pierre
Derris indica (Lam.) Bennet

Common Name: karumtree
Indian beech
karanja

Questionaire : current 20090513 **Assessor:** Chuck Chimera **Designation:** H(HPWRA)
Status: Assessor Approved **Data Entry Person:** Assessor **WRA Score** 7

101	**Is the species highly domesticated?**	**y=-3, n=0**	**n**
102	**Has the species become naturalized where grown?**	**y=1, n=-1**	
103	**Does the species have weedy races?**	**y=1, n=-1**	
201	**Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"**	**(0-low; 1-intermediate; 2-high) (See Appendix 2)**	**High**
202	**Quality of climate match data**	**(0-low; 1-intermediate; 2-high) (See Appendix 2)**	**High**
203	**Broad climate suitability (environmental versatility)**	**y=1, n=0**	**y**
204	**Native or naturalized in regions with tropical or subtropical climates**	**y=1, n=0**	**y**
205	**Does the species have a history of repeated introductions outside its natural range?**	**y=-2, ?=-1, n=0**	**y**
301	**Naturalized beyond native range**	**y = 1*multiplier (see Appendix 2), n= question 205**	**y**
302	**Garden/amenity/disturbance weed**	**n=0, y = 1*multiplier (see Appendix 2)**	**y**
303	**Agricultural/forestry/horticultural weed**	**n=0, y = 2*multiplier (see Appendix 2)**	
304	**Environmental weed**	**n=0, y = 2*multiplier (see Appendix 2)**	
305	**Congeneric weed**	**n=0, y = 1*multiplier (see Appendix 2)**	**n**
401	**Produces spines, thorns or burrs**	**y=1, n=0**	**n**
402	**Allelopathic**	**y=1, n=0**	
403	**Parasitic**	**y=1, n=0**	**n**
404	**Unpalatable to grazing animals**	**y=1, n=-1**	**n**
405	**Toxic to animals**	**y=1, n=0**	**n**
406	**Host for recognized pests and pathogens**	**y=1, n=0**	**n**
407	**Causes allergies or is otherwise toxic to humans**	**y=1, n=0**	
408	**Creates a fire hazard in natural ecosystems**	**y=1, n=0**	
409	**Is a shade tolerant plant at some stage of its life cycle**	**y=1, n=0**	**y**
410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y=1, n=0**	**y**

411	**Climbing or smothering growth habit**	**y=1, n=0**	**n**
412	**Forms dense thickets**	**y=1, n=0**	**n**
501	**Aquatic**	**y=5, n=0**	**n**
502	**Grass**	**y=1, n=0**	**n**
503	**Nitrogen fixing woody plant**	**y=1, n=0**	**y**
504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**y=1, n=0**	**n**
601	**Evidence of substantial reproductive failure in native habitat**	**y=1, n=0**	**n**
602	**Produces viable seed**	**y=1, n=-1**	**y**
603	**Hybridizes naturally**	**y=1, n=-1**	
604	**Self-compatible or apomictic**	**y=1, n=-1**	**y**
605	**Requires specialist pollinators**	**y=-1, n=0**	**n**
606	**Reproduction by vegetative fragmentation**	**y=1, n=-1**	**y**
607	**Minimum generative time (years)**	**1 year = 1, 2 or 3 years = 0, 4+ years = -1**	**>3**
701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	**y=1, n=-1**	**n**
702	**Propagules dispersed intentionally by people**	**y=1, n=-1**	**y**
703	**Propagules likely to disperse as a produce contaminant**	**y=1, n=-1**	**n**
704	**Propagules adapted to wind dispersal**	**y=1, n=-1**	**n**
705	**Propagules water dispersed**	**y=1, n=-1**	**y**
706	**Propagules bird dispersed**	**y=1, n=-1**	**n**
707	**Propagules dispersed by other animals (externally)**	**y=1, n=-1**	**n**
708	**Propagules survive passage through the gut**	**y=1, n=-1**	
801	**Prolific seed production (>1000/m2)**	**y=1, n=-1**	**n**
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y=1, n=-1**	
803	**Well controlled by herbicides**	**y=-1, n=1**	
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y=1, n=-1**	**y**
805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	**y=-1, n=1**	

Designation: H(HPWRA) **WRA Score** 7

Supporting Data:

101	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Is the species highly domesticated? No] No evidence
102	2012. WRA Specialist. Personal Communication.	NA
103	2012. WRA Specialist. Personal Communication.	NA
201	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Species suited to tropical or subtropical climate(s) 2-High] "P. pinnata is a leguminous, nearly evergreen medium-size tree, with short bole and spreading crown. It is indigenous to India, Myanmar, Malaysia and Indonesia. "
202	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Quality of climate match data 2-High]
203	1994. Gilman, E.F./Watson, D.G.. Pongamia pinnata - Pongam. University of Florida IFAS Extension, Gainesville, FL http://edis.ifas.ufl.edu/st498	[Broad climate suitability (environmental versatility)? Yes] "USDA hardiness zones: 10B through 11" [Mostly tropical species but with a broad elevation range]
203	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Broad climate suitability (environmental versatility)? Yes] "This species grows to elevations of 1200 m, but in the Himalayan foothills is not found above 600 m (GOI 1983)." … "The natural distribution of pongam is along coasts and river banks in India and Burma. Native to the Asian subcontinent, this species has been introduced to humid tropical lowlands in the Philippines, Malaysia, Australia, the Seychelles, the United States (Little undated), and Indonesia." [Elevation range may exceed 1000 m; demonstrating environmental versatility]
203	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Broad climate suitability (environmental versatility)? Yes] "It grows along river-banks and close to the sea in tidal estuaries in Bangladesh, tolerating a wide range of climates and soils." [Elevation range may exceed 1000 m; demonstrating environmental versatility]
204	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Native or naturalized in regions with tropical or subtropical climates? Yes] "It is indigenous to India, Myanmar, Malaysia and Indonesia."
205	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL****&entityDisplayCategory=full	[Does the species have a history of repeated introductions outside its natural range? Yes] "It is planted in the humid tropical lowlands around the world, and has been introduced in Egypt and the United States (Florida and Hawaii)."
205	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Does the species have a history of repeated introductions outside its natural range? Yes] "It has also been successfully introduced in many African countries, Australia and New Zealand."
301	1962. Sauer, J.D.. Effects of Recent Tropical Cyclones on the Coastal Vegetation of Mauritius. Journal of Ecology. 50(2): 275-290.	[Naturalized beyond native range? Yes] "The outpost vegetation was dominated by a quite different group of species. A few were recently naturalized from artificial introductions, notably Pongamia pinnata, Mimusops bojeri and Morinda citrifolia" …"Near the mouth of the Riviere des Gallets on the south coast, abundant Pongamia pinnata seedlings were starting in equally deep drift piled on an open grass carpet behind a cobble beach."
301	1976. Morton, J.F.. Pestiferous spread of many ornamental and fruit species in South Florida. Proceedings of the Florida State Horticultural Society. 89: 348-353.	[Naturalized beyond native range? Yes] "Pongamia pinnata Merr. PONGAM. Tropical Asia, Africa, Austrailia, Polynesia. Locally spontaneous from seed, despite Long and Lakela's "doubtfully"."
301	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL****&entityDisplayCategory=full	[Naturalized beyond native range? Yes] "It probably originated from India, Bangladesh, Myanmar and Thailand and is naturalized from Pakistan and Sri Lanka throughout south-east Asia China, Japan, Indonesia, Malaysia to north-eastern Australia, New Zealand, Papua New Guinea, Philippines, Samoa, Seychelles, Solomon Islands, Tonga, Mauritius and Fiji."
301	2003. Wunderlin, R.P./Hansen, B.F.. Guide to the Vascular Plants of Florida. University Press of Florida, Gainsville, FL	[Naturalized beyond native range? Yes] "Disturbed sites. Rare; Palm Beach Co. Native to Asia. Escaped from cultivation."
302	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Garden/amenity/disturbance weed? Yes] "Moreover, it produces root suckers profusely. Because of these characteristics, pongam is unsuitable for agroforestry and has the potential to become a weed if not managed carefully. "
302	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL****&entityDisplayCategory=full	[Garden/amenity/disturbance weed? Yes] "Spontaneous seedlings and root suckers are produced and may cause serious weed problems." [Potential agroforestry or environmental weed]

302	2003. Llamas, K.A.. Tropical Flowering Plants. Timber Press, Portland, OR	[Garden/amenity/disturbance weed? Yes] "Though commonly distributed by landscaping companies as a fast-growing shade tree, pongam, Millettia indica, is a noxious pest in the garden and invasive in wild areas. It is heavily self-seeding and young seedlings require considerable hand-pulling to control" … "Strongly discouraged for landscaping. A controlled species in Florida."
302	2008. Low, T./Booth, C.. The Weedy Truth About Biofuels. The Invasive Species Council, Melbourne	[Garden/amenity/disturbance weed? Yes] "Recommendation: Because this plant has a demonstrated capacity to spread from cultivation, it should not be grown outside its natural range close to national parks or watercourses. It should be declared a restricted plant that cannot be grown near sensitive areas. Some states have an appropriate declaration category but others do not." [Minor weedy tree with suspected potential to become invasive in agroforestry or natural areas]
303	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Agricultural/forestry/horticultural weed? Potentially] "Moreover, it produces root suckers profusely. Because of these characteristics, pongam is unsuitable for agroforestry and has the potential to become a weed if not managed carefully. "
303	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL****&entityDisplayCategory=full	[Agricultural/forestry/horticultural weed? Potentially] "Spontaneous seedlings and root suckers are produced and may cause serious weed problems." [Reference relates to agroforestry, so it has the potential to become a weed of forestry]
304	2002. Hunsberger, A.G.B.. Invasive and Banned Plants of Miami-Dade County. University of Florida IFAS, Homestead, FL	[Environmental weed? Potentially] "Controlled Landscape plants These plants "… may not be planted within 500 feet of native plant communities which they have been known to invade …" [not on FLEPPC list of invasive wildland plants]
304	2004. Kueffer, C./Mauremootoo, J.. Case studies on the status of invasive woody plant species in the Western Indian Ocean 3. Mauritius (islands of Mauritius and Rodrigues). Working Paper FBS/4-3E: .FAO of the United Nations Forestry Department, Rome	[Environmental weed? Potentially] "Pongamia pinnata is naturalized in estuaries." … "On the islands of Rodrigues and Mauritius, the natural habitats of the coastal zone have been destroyed almost completely. Casuarina equisetifolia has been widely planted. Two invasive woody plant species have been identified in the coastal zone: Mimusops coriacea and Pongamia pinnata" … "Not many invasive species affect mangroves. The only abundant invasive woody plant species is Pongamia pinnata (J. Mauremootoo and J.-C. Sevathian, personal observations; Rouillard and Guého 1999)." [Impacts unspecified]
304	2008. Low, T./Booth, C.. The Weedy Truth About Biofuels. The Invasive Species Council, Melbourne	[Environmental weed? Potentially] "Weed status: Pongamia does not pose the same threat as other plants listed here since it is native to northern Australia. But in southern Queensland, where it is grown as a street tree, it has spread into the wild on a small scale, well south of its natural range.1 It seeds prolifically and the seeds germinate readily near parent trees. The spread of this tree into new regions of Australia would be ecologically undesirable, irrespective of its native status in the north."
304	2012. Save Our Waterways Now. Weeds to Whack - Millettia pinnata (FABACEAE) Indian-beech, Pongamia, Pongame. http://www.saveourwaterwaysnow.com.au/01_cms/details_pop.asp?ID=1206	[Environmental weed? Potentially] "Millettia (previously Pongamia) pinnata is thought to have originated in India and is found throughout Asia. Not often naturalised, although propagates with alarming ease under the parent tree. This one may start popping up in warmer areas."
305	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Congeneric weed? No] Millettia dura documented as a weed, but impacts are unspecified.
401	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Produces spines, thorns or burrs? No] "Pongam (Legununosae, subfamily Papilionoideae) is a medium sized tree that generally attains a height of about 8 m and a trunk diameter of more than 50 cm. However, Troup (GOI 1983) reports trees attaining heights of 18 m. The trunk is generally short with thick branches spreading into a dense hemispherical crown of dark green leaves. The bark is thin gray to grayish- brown,and yellow on the inside (GOI 1983). The taproot is thick and long; lateral roots are numerous and well developed.The alternate, compound pinnate leaves consist of 5 or 7 leaflets which are arranged in 2 or 3 pairs, and a single terminal leaflet. Leaflets are 5-10 cm long, 4-6 cm wide, and pointed at the tip. Flowers, borne on racemes, are pink, light purple, or white. Pods are elliptical, 3-6 cm long and 2-3 cm wide, thick walled, and usually contain a single seed. Seeds are 10-20 cm long, fig oblong, and light brown in color."
402	2001. Latha, S./Mariamma, J./Daniel, M.. Studies on the effects of leaf leachates of Pongamia pinnata on certain crops and weeds and the soil mycoflora. National Academy Science Letters. 24: 63-68.	[Allelopathic? Potentially] "The allelopathic effects of the leachates of the leaves of Pongamia pinnata against rice, wheat, Cassia tora and C. occidentalis were studied. The leachates inhibited the performance of both rice and wheat, but exerted no effect on the weeds. The leachates of P. pinnata contained allelochemicals such as vanillic acid, syringic acid, melilotic acid and derivatives of quercetin and kaempferol. The residual phenolics of the soil were more in the case of the weeds. The variety of mycoflora below Pongamia were less compared to control." [Potentially, but study only documents effects under controlled laboratory conditions]

403	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Parasitic? No] "Pongam (Leguminosae, subfamily Papilionoideae) is a medium sized tree that generally attains a height of about 8 m and a trunk diameter of more than 50 cm."
404	1983. Duke, J.A.. Handbook of Energy Crops - Pongamia pinnata. http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html	[Unpalatable to grazing animals? No] "In wet areas of the tropics the leaves serve as green manure and as fodder."
404	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Unpalatable to grazing animals? No] "Opinions vary on the usefulness of this species as a fodder. Troup (GOI 1983) reports that the leaves are eaten by cattle and readily consumed by goats. However, in many areas it is not commonly eaten by farm animals. Its fodder value is greatest in arid regions. According to Singh (1982) the leaves contain 43% dry matter, 18% crude protein, 62% neutral detergent fiber, 40% acid detergent fiber, and in vitro dry matter digestibility of 50%. The presscake, remaining when oil is extracted from the seeds, is used as a poultry feed."
404	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Unpalatable to grazing animals? No] "Descriptors: oils; medicinal products; pesticides; food; fodder; tanstuffs; green manures"
405	1983. Duke, J.A.. Handbook of Energy Crops - Pongamia pinnata. http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html	[Toxic to animals? No] "In wet areas of the tropics the leaves serve as green manure and as fodder. The black malodorous roots contain a potent fish-stupefying principle." … "Both the oil and residues are toxic." [Roots & oil are toxic, but consumption of leaves does not result in poisoning]
405	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Toxic to animals? No] "Fodder and feed. Opinions vary on the usefulness of this species as a fodder. Troup (GOI 1983) reports that the leaves are eaten by cattle and readily consumed by goats. However, in many areas it is not commonly eaten by farm animals. Its fodder value is greatest in arid regions. According to Singh (1982) the leaves contain 43% dry matter, 18% crude protein, 62% neutral detergent fiber, 40% acid detergent fiber, and in vitro dry matter digestibility of 50%. The presscake, remaining when oil is extracted from the seeds, is used as a poultry feed." [No evidence]
406	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Host for recognized pests and pathogens? No] "Pongam attracts many pests and diseases. Some of the important pests are Parnara mathias, Gracillaria sp., Indarbela quadrinotata, Myllocerus curvicornis, and Acrocercops sp. (Anon. 1994). Attacks by these insects cause whitish streaks and the formation of galls on affected leaves."
406	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Host for recognized pests and pathogens? No] "Pests recorded Insects: Aleurodicus dispersus (whitefly) Ascotis selenaria imparata Cameraria virgulata Coccus Cyclopelta siccifolia Megalurothrips distalis Rastrococcus iceryoides (mango mealy bug) Fungus diseases: Aspergillus fumigatus" [A web search did not show any of the above to be recognized, specific pests.]
407	1994. Gilman, E.F./Watson, D.G.. Pongamia pinnata - Pongam. University of Florida IFAS Extension, Gainesville, FL http://edis.ifas.ufl.edu/st498	[Causes allergies or is otherwise toxic to humans? Potentially] "However, the seeds which are contained within the oval, 1.5- inch-long, brown seedpods are poisonous, a fact which should be considered in placing the tree in the landscape, if many children are present."
407	2012. Dave's Garden. PlantFiles: Pongam, Karum Tree, Poonga-Oil Tree, Indian Beech - Pongamia pinnata. http://davesgarden.com/guides/pf/go/93109/	[Causes allergies or is otherwise toxic to humans? Potentially] "Seed is poisonous if ingested"
408	2003. Ansari, S.. WRA Specialist.	[Creates a fire hazard in natural ecosystems? Unknown] Possibly if dried - multi-branched trunk with closely spaced stems.
409	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL****&entityDisplayCategory=full	[Is a shade tolerant plant at some stage of its life cycle? Yes] "It is a shade bearer and can grow under the shade of other trees, it is, however, not a shade demander and grows well even with full overhead light."
409	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Is a shade tolerant plant at some stage of its life cycle? Yes] "- Tolerates drought; shade; frost"
410	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates a wide range of soil conditions? Yes] "It grows along river-banks and close to the sea in tidal estuaries in Bangladesh, tolerating a wide range of climates and soils." …"- Soil texture: light; medium; heavy - Soil drainage: free; seasonally waterlogged - Soil reaction: neutral; alkaline - Special soil tolerances: sodic; saline; infertile"

411	1983. Duke, J.A.. Handbook of Energy Crops - Pongamia pinnata. http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html	[Climbing or smothering growth habit? No] "Fast growing, glabrous, deciduous, tree to ca 25 m tall, branches drooping; trunk diameter to 60 cm; bark smooth, gray."
412	2004. Kueffer, C./Mauremootoo, J.. Case studies on the status of invasive woody plant species in the Western Indian Ocean 3. Mauritius (islands of Mauritius and Rodrigues). Working Paper FBS/4-3E: .FAO of the United Nations Forestry Department, Rome	[Forms dense thickets? No evidence from Mauritius] "Pongamia pinnata is naturalized in estuaries." … "On the islands of Rodrigues and Mauritius, the natural habitats of the coastal zone have been destroyed almost completely. Casuarina equisetifolia has been widely planted. Two invasive woody plant species have been identified in the coastal zone: Mimusops coriacea and Pongamia pinnata" … "Not many invasive species affect mangroves. The only abundant invasive woody plant species is Pongamia pinnata (J. Mauremootoo and J.-C. Sevathian, personal observations; Rouillard and Guého 1999)."
412	2012. Save Our Waterways Now. Weeds to Whack - Millettia pinnata (FABACEAE) Indian-beech, Pongamia, Pongame. http://www.saveourwaterwaysnow.com.au/01_cms/details_pop.asp?ID=1206	[Forms dense thickets? No] "Millettia (previously Pongamia) pinnata is thought to have originated in India and is found throughout Asia. Not often naturalised, although propagates with alarming ease under the parent tree. This one may start popping up in warmer areas." [No evidence to date]
501	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Aquatic? No] Terrestrial
502	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Grass? No] Fabaceae
503	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Nitrogen fixing woody plant? Yes] "Pongamia pinnata is one of the few nitrogen fixing trees (NFTS) to produce seeds containing 30-40% oil."
503	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Nitrogen fixing woody plant? Yes] "P. pinnata is a leguminous, nearly evergreen medium-size tree, with short bole and spreading crown. "
504	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Pongam (Legununosae, subfamily Papilionoideae) is a medium sized tree that generally attains a height of about 8 m and a trunk diameter of more than 50 cm."
601	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Evidence of substantial reproductive failure in native habitat? No] ")Natural reproduction is profuse by seed and common by root suckers"
601	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL***&entityDisplayCategory=full	[Evidence of substantial reproductive failure in native habitat? No] "In India, seed ripens from February to May."
602	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Produces viable seed? Yes] "Natural reproduction is profuse by seed and common by root suckers"
602	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL***&entityDisplayCategory=full	[Produces viable seed? Yes] "In India, seed ripens from February to May." … "Spontaneous seedlings and root suckers are produced and may cause serious weed problems."
603	2012. WRA Specialist. Personal Communication.	[Hybridizes naturally? Unknown]
604	2006. Solomon Raju, A.J.. Bio-Diesel: An Eco-Friendly Sustainable Fuel Source. Andhra University, Visakhapatnam http://www.nbaindia.org/docs/ncb_jan_06_8.pdf	[Self-compatible or apomictic? Yes] "Bees while collecting forage trip the floral mechanism causing self or cross-pollination."
604	2006. Solomon Raju, A.J./Purnachandra Rao, S.. Explosive pollen release and pollination as a function of nectarfeeding activity of certain bees in the biodiesel plant, Pongamia pinnata (L.) Pierre (Fabaceae). Current Science. 90(7): 960-967.	[Self-compatible or apomictic? Yes] "Bees and wasps were found collecting floral rewards from different individuals, contributing to both self- and cross-pollination." … "In effect, the stigma is most likely to receive cross pollen first from the bodies of the bees and it may also receive some self-pollen during keel explosion."

605	1987. Abrol, D.P./Kapil, R.P.. Nectar dilution pattern of bees in semi-arid environments. Current Science. 13: 681.	[Requires specialist pollinators? No] Apis mellifera and of Megachile cephalotes forage on the flowers
605	2006. Solomon Raju, A.J.. Bio-Diesel: An Eco-Friendly Sustainable Fuel Source. Andhra University, Visakhapatnam http://www.nbaindia.org/docs/ncb_jan_06_8.pdf	[Requires specialist pollinators? No] "Flowering occurs during summer season. The flowers are purplish-white, bisexual and nectariferous. They have explosive floral mechanism and bees trip the mechanism causing the release and deposition of pollen on them. This finally ends up in pollination. The bees such as Apis, Trigona, Ceratina, Pithitis, Megachile, Amegilla and Xylocopa use the flowers as pollen and nectar sources. This plant is an excellent floral source for honeybees to produce honey during summer period. Bees while collecting forage trip the floral mechanism causing self or cross pollination. Butterflies and wasps also utilize this as nectar source occasionally but have a minor role in pollination."
605	2006. Solomon Raju, A.J./Purnachandra Rao, S.. Explosive pollen release and pollination as a function of nectarfeeding activity of certain bees in the biodiesel plant, Pongamia pinnata (L.) Pierre (Fabaceae). Current Science. 90(7): 960-967.	[Requires specialist pollinators? No] "The plant is primarily dependent on bee species such as Apis dorsata, A. cerana indica, Amegilla sp., Megachile sp., Xylocopa latipes and X. pubescens for pollination. Wasps also cause keel explosion and pollination, but they are occasional visitors only. Other bees and thrips also collect pollen and nectar droplets present on wing and keel petals; the former group acts primarily as pollen thieves and the latter also as nectar thieves. The flowers stay open only on the day of anthesis and remain closed for the other two successive days of flower-life. Unpollinated flowers fall off while pollinated ones develop into fruits."
606	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Reproduction by vegetative fragmentation? Yes] "Natural reproduction is profuse by seed and common by root suckers."
606	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL****&entityDisplayCategory=full	[Reproduction by vegetative fragmentation? Yes] "Spontaneous seedlings and root suckers are produced and may cause serious weed problems."
606	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Reproduction by vegetative fragmentation? Yes] "- Ability to sucker; coppice; pollard"
607	1983. Duke, J.A.. Handbook of Energy Crops - Pongamia pinnata. http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html	[Minimum generative time (years)? 4+] "Trees of ten reach adult height in 4 or 5 years, bearing at the age of 4–7 years."
607	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL****&entityDisplayCategory=full	[Minimum generative time (years)? 5+] "Pod production starts 5-7 years after sowing."
701	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL****&entityDisplayCategory=full	[Propagules likely to be dispersed unintentionally? No] "Fruits: Pods borne in quantities, smooth, oblique oblong to ellipsoid, 3-8 x 2-3.5 x 1 1.5 cm, flattened but slightly swollen, slightly curved with short, curved point (beaked), brown, thick-walled, thick leathery to sub woody, hard, indehiscent, 1-2 seeded, short stalked. Seeds: Seed compressed ovoid or elliptical, bean-like, 1.5-2.5 x 1.2-2 x 0.8 cm, with a brittle coat long, flattened, dark brown, oily." [Unlikely. Pods and seeds relatively large and lack a means of exernal attachment]
702	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Propagules dispersed intentionally by people? Yes] "It is often planted as a roadside and shade tree, having handsome scented flowers, and is easily raised from seed and cuttings."
703	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL****&entityDisplayCategory=full	[Propagules likely to disperse as a produce contaminant? No] "Fruits: Pods borne in quantities, smooth, oblique oblong to ellipsoid, 3-8 x 2-3.5 x 1 1.5 cm, flattened but slightly swollen, slightly curved with short, curved point (beaked), brown, thick walled, thick leathery to sub woody, hard, indehiscent, 1-2 seeded, short stalked. Seeds: Seed compressed ovoid or elliptical, bean-like, 1.5 2.5 x 1.2-2 x 0.8 cm, with a brittle coat long, flattened, dark brown, oily." [Unlikely. Pods and seeds relatively large]
704	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL****&entityDisplayCategory=full	[Propagules adapted to wind dispersal? No] "Fruits: Pods borne in quantities, smooth, oblique oblong to ellipsoid, 3-8 x 2-3.5 x 1 1.5 cm, flattened but slightly swollen, slightly curved with short, curved point (beaked), brown, thick walled, thick leathery to sub woody, hard, indehiscent, 1-2 seeded, short stalked. Seeds: Seed compressed ovoid or elliptical, bean-like, 1.5 2.5 x 1.2-2 x 0.8 cm, with a brittle coat long, flattened, dark brown, oily." … "Pod production starts 5-7 years after sowing. They do not open naturally, and must decay before seeds can germinate." [Seeds do not have any adaptation for wind dispersal]

704	2010. Teegalapalli, K./Hiremath, A.J./Jathanna, D.. Patterns of seed rain and seedling regeneration in abandoned agricultural clearings in a seasonally dry tropical forest in India. Journal of Tropical Ecology. 26: 25–33.	[Propagules adapted to wind dispersal? Possibly] "Appendix 1. List of native tree species, seeds of which were collected from seeds traps in this study in Bhadra. Also given are the locations where seeds of each species were encountered (C=in clearings; F=in the adjoining forests), and the species dispersal mode (B/M=bird/mammal dispersed, W/G=wind/gravity dispersed)." [Pongamia pinnata = W/G=wind/gravity dispersed. Probably gravity]
705	1991. Sauer, J.D.. Plant Migration: The Dynamics of Geographic Patterning in Seed Plant Species. University of California Press, Berkeley & Los Angeles, CA	[Propagules water dispersed? Yes] "In the late nineteenth century, Pongamia pinnata was imported from the Seychelles. All of these have become naturalized as volunteers in natural coastal habitats on Mauritius, probably spreading around the island by floating seeds."
705	1999. Arathi, H.S./Ganeshaiah, K.N./Uma Shaanker, R./Hegde, S.G.. Seed abortion in Pongamia pinnata (Fabaceae). American Journal of Botany. 86(5): 659–662.	[Propagules water dispersed? Presumably Yes] "There is no information about the mode of dispersal of the seeds of P. pinnata. However, the pod features represent the syndromes associated with water dispersal (Ridley, 1930) and the pods stay afloat in water for more than two months (personal observation). Therefore, reduced wing loading by decreasing seed number could be hypothesized as a selection towards increased dispersal efficiency."
706	1994. Gilman, E.F./Watson, D.G.. Pongamia pinnata - Pongam. University of Florida IFAS Extension, Gainesville, FL http://edis.ifas.ufl.edu/st498	[Propagules bird dispersed? No] "Fruit characteristics: does not attract wildlife"
706	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Propagules bird dispersed? No] "Pods are elliptical, 3-6 cm long and 2-3 cm wide, thick walled, and usually contain a single seed. Seeds are 10-20 cm long, fig oblong, and light brown in color" [Not fleshy-fruited]
707	1983. Duke, J.A.. Handbook of Energy Crops - Pongamia pinnata. http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html	[Propagules dispersed by other animals (externally)? No] "Pod short stalked, oblique-oblong, flat, smooth, thickly leathery to subwoody, indehiscent, 1-seeded; seed thick, reniform (Allen and Allen, 1981)." [No evidence, and no means of external attachment]
707	1994. Gilman, E.F./Watson, D.G.. Pongamia pinnata - Pongam. University of Florida IFAS Extension, Gainesville, FL http://edis.ifas.ufl.edu/st498	[Propagules dispersed by other animals (externally)? No] "Fruit characteristics: does not attract wildlife"
708	1983. Duke, J.A.. Handbook of Energy Crops - Pongamia pinnata. http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html	[Propagules survive passage through the gut? Unknown] "In wet areas of the tropics the leaves serve as green manure and as fodder." [Unknown if pods or seeds are consumed, and whether or not they can survive passage through the gut of an animal]
801	1999. Arathi, H.S./Ganeshaiah, K.N./Uma Shaanker, R./Hegde, S.G.. Seed abortion in Pongamia pinnata (Fabaceae). American Journal of Botany. 86(5): 659–662.	[Prolific seed production (>1000/m2)? No] "In Pongamia pinnata only one of the two ovules develops into a seed in most of the pods." … "The prevalence of single-seeded pods in P. pinnata seems therefore to be a result of competition between the two seeds for maternal resources. The evolutionary significance of single-seeded pods in P. pinnata is discussed with respect to possible dispersal advantage enjoyed by such pods."
801	2001. EcoPort. Pongamia pinnata. http://ecoport.org/ep?Plant=1781&entityType=PL****&entityDisplayCategory=full	[Prolific seed production (>1000/m2)? No] "Pods… 1-2 seeded" … "Seed compressed ovoid or elliptical, bean like, 1.5-2.5 x 1.2-2 x 0.8 cm, with a brittle coat long, flattened, dark brown, oily. There are 1500-1700 seeds/kg." [Harvested seed amounts unlikely to reach such high densities as seeds are relatively large, with relatively few per pod]
802	1983. Duke, J.A.. Handbook of Energy Crops - Pongamia pinnata. http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html	[Evidence that a persistent propagule bank is formed (>1 yr)? Potentially] "Seeds, remaining viable for sometime, no special scarification."
802	1997. Daniel, J.N.. NFT Highlights: NFTA 97-03, June 1997. A quick guide to useful nitrogen fixing trees from around the world. Pongamia pinnata - a nitrogen fixing tree for oilseed. http://www.winrock.org/fnrm/factnet/factpub/FACTSH/P_pinnata.html	[Evidence that a persistent propagule bank is formed (>1 yr)? Potentially] "Seeds, which require no treatment before sowing, remain viable for about a year when stored in air-tight containers."
802	2008. Kundu, M.. Prediction of viability of seeds of Pongamia pinnata (Karanj) under controlled conditions. Seed Science and Technology. 36(2): 481-485.	[Evidence that a persistent propagule bank is formed (>1 yr)? Potentially] "Viability equations were used to predict the longevity of seeds of Pongamia pinnata stored at different conditions. The viability constants for this particular species were estimated and the fitness of the equations was discussed. The storage life of 40 years was derived for seeds dried to 4.5% moisture content and stored at 5°C; this was followed by 16 years of viability with the seeds dried to 4.5% moisture content and stored at 15°C. " [Evidence from lab conditions]

802	2011. Millettia Plantations. Millettia pinnata: the sustainable biofuel crop of the future.	[Evidence that a persistent propagule bank is formed (>1 yr)? Potentially] "Long life-span. Millettia has a lifespan of 100 years with a productive oil seed lifespan of 60 years" [No evidence from natural settings]
803	2012. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown] No information on herbicide efficacy or chemical control of this species
804	1983. Duke, J.A.. Handbook of Energy Crops - Pongamia pinnata. http://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Root suckers are rather plentiful as well. It is a rapid-growing coppice species that can be cloned."
804	2002. Williams, P.R.. The effect of fire regime on tropical savannas of north-eastern Australia: interpreting floristic patterns through critical life events. PhD Dissertation. James Cook University, Townsville	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Appendix 2. Post fire regeneration observations from eucalypt savanna at Cape Cleveland, Castle Hill, Many Peaks Range and Mt Elliot. Regeneration codes from Gill and Bradstock (1992): 2, killed by fire & regenerates by seed germination from soil stored seedbank; 4, sprouting from roots or rhizomes; 5, sprouting from base of plant; 6, sprouting from stem or branch. Additional codes: s, post-fire seed germination observed for sprouting species or species whose ability to sprout unknown; *, exotic species." [Pongamia pinnata = 5, sprouting from base of plant; Recovers from fire]
804	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "- Ability to sucker; coppice; pollard"
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown